Area of Skin Numbness after Less Invasive Total Knee Arthroplasty Surgery: A prospective study

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Purpose: *The objective of this study was to assess the area of skin numbness after less invasive total knee arthroplasty (TKA) surgery and to compare the area of skin numbness between groups in which the skin incision length was less than or equal to 10 cm and more than 10 cm.*

Methods: *A prospective study was conducted. 58 TKAs who had undergone primary TKA for osteoarthritis were recruited into this study. All patients were performed by a less invasive surgical technique. The necessity for extending the incision length depended on skin tension, intraoperatively of each patient. Based on the skin incision length, the population was categorized into two groups. Patients with skin incision lengths of less than or equal to 10 cm formed group A (29 patients), whereas patients with a skin incision length of more than 10 cm formed group B (29 patients). The areas of skin numbness were measured with the knee in full extension using a blunt pin for pin-prick sensation. The measurement area of skin numbness was performed at 2 weeks, 1 month, 3 months, and 6 months postoperatively.*

Results: *In group A, the mean area of skin numbness was 31.74 cm^2, 30.94 cm^2, 29.58 cm^2 and 9.60 cm^2 at 2 weeks, 1 month, 3 months, and 6 months postoperatively, respectively. In group B, the mean area of skin numbness was 51.14 cm^2, 39.50 cm^2, 27.67 cm^2 and 11.83 cm^2 at 2 weeks, 1 month, 3 months, and 6 months postoperatively, respectively. The area of skin numbness decreased over time in both groups.*

Conclusions: *This study demonstrated the area of skin numbness after TKA depends on the length of skin incision and that the skin sensation improved with time.*

Keywords: *Area, skin numbness, less invasive surgery, total knee replacement, length of skin incision.*

The Thai Journal of Orthopaedic Surgery: 38 No.1-2: 27-30
Full text. e journal: *http://www.rcost.or.th, http://thailand.digitaljournals.org/index.php/JRCOST*

Introduction

Nowadays, primary total knee arthroplasty (TKA) has proved to be an excellent and successful clinical procedure for relieving pain in patients with degenerative joint diseases. The 10- to 15-year survivorship of primary TKA is more than 90%.[1,2] Although excellent results have been achieved, several complications after TKA were reported such as loosening, periprosthetic fracture, and infection. In addition, skin numbness is a common symptom, which occurs after TKA. However, it was less recognized. Previous studies[3-5,7] reported about the area of skin numbness after TKA with a conventional surgical approach. To our knowledge, there has been no study in skin numbness after TKA with a less invasive surgical approach. The purpose of our study was to assess the area of skin numbness after less invasive TKA and compare the area of skin numbness between groups with skin incision lengths of less than or equal to 10 cm and those with more than 10 cm.

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Methods

Between June 1, 2009 and December 31, 2009, we performed a prospective study of 58 TKAs who have undergone primary TKA for osteoarthritis by one surgeon. (AT). The inclusion criteria were primary TKA in patients with degenerative osteoarthritis of the knee. Exclusion criteria were previous knee surgery, previous impaired sensation of the knee, and history of diabetes mellitus. All surgeries were performed using a less invasive surgical technique. The necessity for extending the skin incision depended on skin tension, intraoperatively of each patient[6]. Based on the length of the skin incision, the studied group was categorized into two groups, including patients with skin incisions of less than or equal to 10 cm (group A), and patients with skin incision lengths of more than 10 cm (group B). The surgical procedure was similar in both groups. All surgical exposures were performed through a medial parapatellar skin incision and midvastus arthrotomy. All TKAs were performed using a measured resection technique and a single prosthetic design (NexGen LPS–flex, Zimmer, Warsaw, IN, USA).

The area of skin numbness was measured with the knee in full extension using a blunt pin for pin-prick sensation. The area was mapped out on the patient and transferred to paper for measurement. This measurement was done by a single observer. The measurement area of skin numbness was performed at 2 weeks, 1 month, 3 months, and 6 months postoperatively.

Results

In group A, there were 29 patients with a mean age of 68.40 years. The male to female ratio was 0:29. The right side to left side ratio was 15:14. The mean length of the skin incision was 9.07 cm (range, 7.50-10.00 cm). In group B, there were 29 patients with a mean age of 71.40 years. The male to female ratio was 4:25. The right side to left side ratio was 21:8. The mean length of skin incision was 11.60 cm (range, 10.50-14.50 cm) as shown in Table 1.

All knees sustained an area of skin numbness lateral to the medial parapatellar incision. The area of skin numbness decreased over the time of follow-up in both groups. At postoperative evaluation, the mean area of skin numbness in group A was 31.74 cm^2 (range, 10-67.5), 30.94 cm^2 (range, 6-65), 29.58 cm^2 (range, 0-35.75), and 9.60 cm^2 (range, 0-17.5) at 2 weeks, 1 month, 3 months, and 6 months, respectively. In group B, the mean area of skin numbness was 51.14 cm^2 (range, 20-110.25), 39.50 cm^2 (range, 16-80), 27.67 cm^2 (range, 4-77), and 11.83 cm^2 (range, 1-17.5) at 2 weeks, 1 month, 3 months, and 6 months, respectively. Comparative parameters were shown in Fig. 1.

Table 1 Demographic data of all participants

	Group A (Skin incision length ≤ 10 cm)	**Group B (Skin incision length > 10 cm)**
N	29	29
Mean age (years)	68.40	71.40
Male/Female	-/29	4/25
Side (right/left)	15/14	21/8
Mean incision length (cm)	9.07 (7.50-10.00)	11.60 (10.50-14.50)

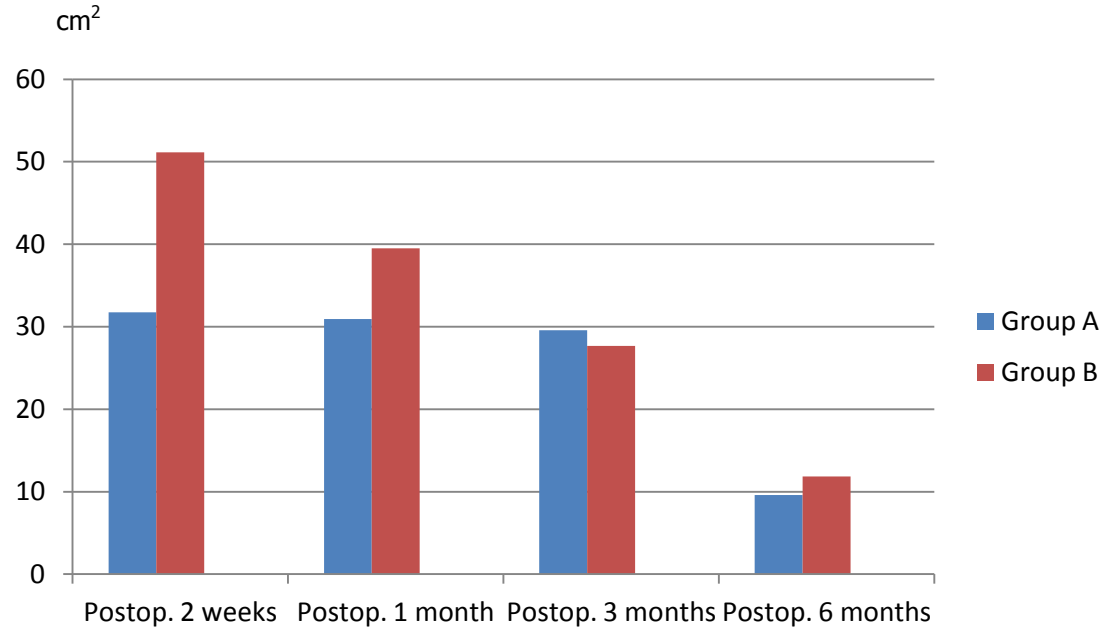

Fig. 1 The area of skin numbness (cm^2) showing decreasing over time in both groups. In Group A (skin incision length ≤ 10 cm), the area of skin numbness was smaller than group B (skin incision length > 10 cm)

Discussion

Skin numbness was a common symptom which patients complained of after knee arthroplasties. A few studies have reported this complication. Borley et al[3] reported results of the area of skin numbness in 25 consecutive primary TKAs following the use of a midline incision, they found the median for pin-prick loss was 86 cm^2 at the median, 11 months postoperatively. Johnson et al[4], study in 26 TKAs using a medial parapatellar skin incision. The mean residual area of skin numbness was 33 cm^2 at 2 years postoperatively. Sundaram et al[5], who compared the area of skin numbness between medial parapatellar and midline skin incisions in TKA, have not demonstrated a statistically significant difference in the area of numbness at a mean follow up of 2.5 years (28.9cm^2 VS 23.8 cm^2).

However, all previous studies were demonstrated using conventional skin incision techniques. To our knowledge, the current study is the first report in a less invasive surgical technique. We found all knees sustained an area of skin numbness lateral to the medial parapatellar incision and the numbness showed a decrease over time. The mean area of skin numbness at 6 months postoperatively was 9.60 cm^2 in group A and 11.83 cm^2 in group B. Our study demonstrated group A, in which the skin incision length was shorter, had a smaller area of skin numbness.

Compared to previous studies, which were performed using conventional skin incision techniques, and the less invasive surgery technique in the current study, the area of skin numbness was smaller in our study. It might be explained by less injury to the anterior and medial cutaneous branches of the femoral nerve or the infrapatellar branch of the saphenous nerve[8]. Similarly, Hopton et al report that patients with scars over 22 cm long had a mean numb area of 82.0 cm^2 as opposed to 31.7 cm^2 if their scar was less than 18 cm in length. Not only skin incision length, which influenced the area of skin numbness, but also the site of incision might be influence this complication. Berg et al[9], demonstrated the lateral incision produced less dysaesthesia than a medial incision.

This study demonstrated the area of skin numbness after TKA depends on the length of skin incision and that the skin sensation improved with time.

Acknowledgements

We are grateful for the time our patients devoted to us. That gives us new knowledge.

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ขนาดพื้นที่ของผิวหนังที่มีอาการชาหลังผ่าตัดเปลี่ยนข้อเข่าเทียมแบบเนื้อเยื่อบาดเจ็บน้อย, การศึกษาแบบไปข้างหน้า

อารักษ์ ลิ่มตระกูล, พบ, อารี ตนาวลี, พบ, สีหธัช งามอุโฆษ, พบ, ศรัณย์ ตันติ์ทวิสุทธิ์, พบ

วัตถุประสงค์: *การศึกษานี้ต้องการศึกษาขนาดพื้นที่ของผิวหนังที่มีอาการชาหลังผ่าตัดเปลี่ยนข้อเข่าเทียมแบบเนื้อเยื่อบาดเจ็บน้อย และได้เปรียบเทียบขนาดพื้นที่ของผิวหนังที่มีอาการชาในผู้ป่วยที่มีแผลขนาดน้อยกว่าหรือเท่ากับ 10 ซม. และมากกว่า 10 ซม.*

วิธีการศึกษา: *การศึกษานี้เป็นการศึกษาแบบไปข้างหน้า ประกอบด้วยผู้ป่วยที่ได้รับการผ่าตัดเปลี่ยนข้อเข่าเทียมแบบเนื้อเยื่อบาดเจ็บน้อยจำนวน 58 ราย แบ่งผู้ป่วยเป็น 2 กลุ่ม คือ กลุ่ม A (ขนาดแผลน้อยกว่า 10 ซม.) 29 ราย และกลุ่ม B (ขนาดแผลมากกว่า 10 ซม.) 29 ราย ทั้งนี้การขยายขนาดแผลผ่าตัดขึ้นอยู่กับความตึงของผิวหนังของผู้ป่วยในระหว่างผ่าตัด การวัดขนาดพื้นที่อาการชาใช้ไม้ปลายทู่ ประเมิน pin-prick sensation ในขณะที่ผู้ป่วยอยู่ในท่าเข่าเหยียดและนำมาคำนวณขนาดพื้นที่ในกระดาษ โดยทำการประเมินพื้นที่หลังผ่าตัดที่สัปดาห์ที่ 2, เดือนที่ 1, เดือนที่ 3 และเดือนที่ 6 หลังผ่าตัด*

ผลการศึกษา: *ขนาดพื้นที่เฉลี่ยของผิวหนังที่มีอาการชาหลังผ่าตัดของผู้ป่วยกลุ่ม A คือ 31.74 ตร.ซม., 30.94 ตร.ซม., 29.58 ตร.ซม. และ 9.60 ตร.ซม. ที่สัปดาห์ที่ 2, เดือนที่ 1, เดือนที่ 3 และเดือนที่ 6 หลังผ่าตัด ตามลำดับ และในผู้ป่วยกลุ่ม B คือ 51.14 ตร.ซม., 39.50 ตร.ซม., 27.67 ตร.ซม. และ 11.83 ตร.ซม. ที่สัปดาห์ที่ 2, เดือนที่ 1, เดือนที่ 3 และเดือนที่ 6 หลังผ่าตัด ตามลำดับ ในขณะที่ขนาดพื้นที่ของผิวหนังที่มีอาการชาของทั้ง 2 กลุ่มลดลงตามระยะเวลา*

สรุป: *จากการศึกษาสรุปได้ว่าขนาดพื้นที่ของผิวหนังที่มีอาการชาหลังผ่าตัด ขึ้นกับขนาดความยาวของแผลผ่าตัดและขนาดพื้นที่อาการชาจะลดลงตามระยะเวลา*